



NOISE

INTRODUCTION AND VISION FOR THE FUTURE

The urban environment contains a variety of noise sources that can affect the way people live and work. Some types of noise are only short-term irritants, like the pounding of a jackhammer or the whine of a leaf blower. These noise sources can generally be controlled through City noise regulations, including noise ordinances. However, certain noises, such as freeway, road, aircraft, and train noise, may be permanent fixtures in the community, diminishing its quality of life. In Orange, because of its location, transportation corridors are the major source of noise.

Orange's *Vision for the Future*, presented in the General Plan introduction, includes the following objective related to the Noise Element:

- The City will work to improve the quality of life for all residents by providing residential, commercial, industrial, and public uses that exist in harmony with the surrounding urban and natural environments.

The Noise Element is a mandatory General Plan element, required by California's Health and Safety Code Section 46050.01. The goal of the Noise Element is to identify problems and noise sources threatening community safety and comfort and to establish policies and programs that will limit the community's exposure to excessive noise levels. It addresses both existing and foreseeable future noise abatement issues.

Purpose of the Noise Element

Recognizing that excessive or unusual noise can have significant adverse impacts on human health and welfare, the state has developed definitive guidelines for determining community noise levels and for establishing programs aimed at reducing community exposure to noise levels defined to be adverse. Policies, plans, and programs outlined within the Noise Element are designed to minimize the effects of human-caused noise in the community, and to improve residents' quality of life by regulating and reducing noise, particularly within residential areas and near such noise-sensitive land uses as residences, hospitals, convalescent and day care facilities, schools, and libraries. The Element provides direction regarding best practices and strategies to protect City residents and businesses from severe noise levels.

The Noise Element recognizes that multiple noise environments exist within the City, including rural, suburban, and urban environments. As Orange evolved from a rural agricultural town to a bustling suburban community in the middle to late 20th century, the noise environment similarly changed. Rural roads were replaced by the arterials and



freeways present in Orange today. Relatively quiet suburban residential noise levels became the norm for most City residents. At the outset of the 21st century, Orange still has semi-rural areas in the eastern portions of the City, in addition to the suburban noise environment found in most of its residential neighborhoods and commercial areas. However, a noisier, more urban environment is now emerging in Uptown, and Land Use Element policies promote reinvention of certain City commercial corridors into mixed-use activity centers. At these mixed-use activity centers, residents, shoppers, and businesspeople alike may be exposed to higher noise levels due to traffic and human activity.

Scope and Content of the Noise Element

The Noise Element consists of three sections:

- (1) Introduction;
- (2) Issues, Goals, and Policies; and
- (3) Noise Plan.

This Introduction summarizes the general purpose of the Noise Element. The Issues, Goals, and Policies section outlines the most relevant noise issues affecting the City. The goals are a statement of the general direction and broad ideals that capture the desire of the community. The policies provide potential solutions for decreasing noise. The Noise Plan defines noise standards, presents noise contour maps, and recommends strategies to achieve goals and implement policies. Implementation programs for the Noise Element are provided in an Appendix to the General Plan.

The Noise Element addresses noise concerns that influence the comfort and quality of life of Orange residents. Excessive noise may originate from many sources, including vehicle traffic on freeways and arterial roadways, construction activities and machinery in industrial areas, railroads, and aircraft. Beyond direct mitigation strategies to address these sources of noise, the City is also committed to establishing and upholding guidelines for noise levels compatible with various types of land use activity.

Mixed-use residential and commercial development presents unique noise reduction challenges. Although located in commercial environments, the residential portions of mixed-use projects are nonetheless subject to residential noise standards and guidelines established by the state. Strategies to address noise in these environments focus on incorporation of noise reducing measures in project design.

Relationship to Other General Plan Elements

Accomplishing the goals and policies of the Noise Element requires coordination with other related components of the City's General Plan. Other topics that are affected by the Noise Element include the Land Use, Circulation & Mobility, and Housing Elements.

Impacts of noise policies and programs on the Land Use Element arise during identification of noise sources and noise-sensitive uses. The noise contours and land use compatibility standards contained in the Noise Element should be used when making planning and development decisions.



The contents of the Noise Element are also related to the Circulation & Mobility and Housing Elements, because Orange’s primary noise sources include freeways, arterial roadways, railways, and aircraft. In turn, Noise Element policies are intended to mitigate excessive noise along transportation routes and direct housing to appropriate sites away from sources of excessive noise.

ISSUES, GOALS AND POLICIES

Certain areas of Orange are subject to high levels of noise from one or more of the following sources: freeways and arterial roadways, construction activities and machinery in industrial areas, railroads, aircraft, and fireworks noise from nearby Disneyland and Angel Stadium. All of these noise sources reduce the quality of life within the City. Considering noise sources in the planning process, identifying the noise impacts of potential development projects, and planning accordingly are effective methods of minimizing the impacts of noise on residents. The goals, policies, and implementation programs of the Noise Element address seven issues: (1) noise and land use compatibility; (2) vehicular traffic noise; (3) train noise; (4) aircraft noise; (5) noise associated with mixed-use development; (6) industrial noise; and (7) construction, maintenance, and nuisance noise.

Noise and Land Use Compatibility

Land use directly affects noise compatibility, because higher noise levels often associated with industrial, commercial, and mixed commercial and residential development can encroach upon more noise-sensitive land uses. Noise-sensitive land uses include: residences, hospitals, convalescent and day care facilities, schools, and libraries. Noise producing and noise-sensitive land uses should be either sufficiently separated or sufficiently buffered from one another to ensure that sensitive uses are not exposed to unacceptable noise levels.

Proposed land uses should be compatible with existing and forecasted future noise levels. Incompatible land use noise exposures should incorporate noise attenuation and/or control measures within project design to reduce the noise to an acceptable interior level of 45 A-weighted decibels (dBA) community noise equivalent level (CNEL) or lower, as required by state regulations (CCR Title 24) for residential uses. (For an explanation of these terms and the relative noise levels of common noise-producing activities, see the discussion accompanying Table N-2 in the “Measuring Noise” section that follows.)

GOAL 1.0: Promote a pattern of land uses compatible with current and future noise levels.

Policy 1.1: Consider potential excessive noise levels when making land use planning decisions.

Policy 1.2: Encourage new development projects to provide sufficient spatial buffers to separate excessive noise generating land uses and noise-sensitive land uses.

Policy 1.3: Incorporate design features into residential and mixed-use projects that can be used to shield residents from excessive noise.

Policy 1.4: Ensure that acceptable noise levels are maintained near noise-sensitive uses.

Policy 1.5: Reduce impacts of high-noise activity centers located near residential areas.



- Policy 1.6: Require an acoustical study for proposed developments in areas where the existing and projected noise level exceeds or would exceed the maximum allowable levels identified in Table N-3. The acoustical study shall be performed in accordance with the requirements set forth within this Noise Element.

Vehicular Traffic Noise

Vehicular traffic is the most common source of noise experienced throughout the City. Primary sources of traffic noise include: the Interstate 5 and State Route (SR) -22, -55, -57, and -91 Freeways which surround and traverse the City; the SR-241/261 Foothill Transportation Corridor; and City arterial roadways. Arterials such as State College Boulevard/The City Drive, Chapman Avenue, La Veta Avenue, Batavia Street, Glassell Street, Tustin Street, Katella Avenue, and Jamboree Road are all high traffic volume roadways that generate traffic noise levels well above 65 dBA CNEL. Traffic noise is dependent on vehicle volume, speed, flow, and fleet mix, as well as distance from the roadway to the receptor.

GOAL 2.0: Minimize vehicular traffic noise in residential areas and near noise-sensitive land uses.

- Policy 2.1: Encourage noise-compatible land uses along existing and future roadways, highways, and freeways.
- Policy 2.2: Encourage coordinated site planning and traffic control measures that minimize traffic noise in noise-sensitive land use areas.
- Policy 2.3: Encourage the use of alternative transportation modes such as walking, bicycling, mass transit, and alternative fuel vehicles to minimize traffic noise.
- Policy 2.4: Continue to work with the California Department of Transportation (Caltrans), the Orange County Transit Authority (OCTA), and Transportation Corridor Agencies (TCA) to install, maintain, and update freeway and highway rights-of-way buffers and soundwalls.
- Policy 2.5: Work toward understanding and reducing traffic noise in residential neighborhoods with a focus on analyzing the effects of traffic noise exposure throughout the City.

Train Noise

Train noise currently experienced within the City results from the locomotive engines and warning horns associated with rail operations. These daily operations tend to produce high short-term noise levels that can be a source of annoyance to nearby sensitive uses. Depending on the number of daily movements, train operations also have the potential to generate noise levels that exceed 65 dBA CNEL along the rail corridors.

GOAL 3.0: Minimize train noise in residential areas and near noise-sensitive land uses.

- Policy 3.1: Encourage noise-compatible land uses and incorporate noise-reducing design features within transit oriented, mixed-use development near rail corridors.



Aircraft Noise

Although no airports or airfields are located in Orange, noise generated by aircraft overflights can be noticeable throughout the City. Aircraft operations associated with John Wayne Airport, Long Beach Airport, and even Los Alamitos Army Airfield use the airspace above the City in arrival and departure operations. The general noise environment in the City also includes helicopter noise from private, police, emergency medical, and news/traffic monitoring helicopters.

GOAL 4.0: Minimize aircraft related noise in residential areas and near noise-sensitive land uses.

Policy 4.1: Continue to provide input to the Orange County Airport Land Use Commission as appropriate to minimize airport noise.

Policy 4.2: Continue to work with regional, state, and federal agencies, including officials at John Wayne Airport and Long Beach Airport, to implement noise-reducing measures and to monitor and reduce noise associated with aircraft.

Policy 4.3: Continue to coordinate with the Federal Aviation Administration, Caltrans Division of Aeronautics, and the Orange County Airport Land Use Commission regarding the siting and operation of heliports and helistops in order to minimize excessive helicopter noise.

Mixed-use Development

Mixed-use development projects often include both residential uses located above or in close proximity to commercial uses and stand-alone multi-family residential uses, especially in areas served by rail and bus transit, along major roadways and the railroad corridor. Noise generated by commercial uses can include mechanical equipment operations, maintenance activities, public address systems, vehicles, entertainment, parking lots, loading operations, and trash collection, as well as pedestrian and business patron noise. A unique challenge presented by mixed-use development is that on one hand, such uses desire locations along busy street corridors and within activity centers, and on the other hand, state-mandated interior noise requirements for residential uses must be met within the residential portions of such use.

GOAL 5.0: Minimize commercial activity noise in residential portions of mixed-use areas where residential units are located above commercial uses or within the same development.

Policy 5.1: Encourage the design and construction of mixed-use structures to minimize commercial noise within the residential components of the development.

Policy 5.2: Encourage new mixed-use development to locate the residential component of the development away from noise-generating sources such as mechanical equipment, entertainment facilities, gathering places, loading bays, parking lots, driveways, and trash enclosures.

Policy 5.3: Encourage residential developments within mixed-use developments and located adjacent to commercial or retail and entertainment related uses to notify potential residents that they may be affected by noise from these uses.



Industrial Noise

Industrial land uses have the potential to generate noise that can be considered intrusive to sensitive land uses. Depending on the type of industrial operation, noise sources could involve mechanical equipment, loading and unloading of vehicles and trucks, as well as amplified or unamplified communications. The level and intrusiveness of the noise generated also vary depending on the size of the facility, type of business, hours of operation, and location relative to sensitive land uses.

GOAL 6.0: Minimize industrial activity noise in residential areas and near noise-sensitive land uses.

Policy 6.1: Encourage the design and construction of industrial uses to minimize excessive noise through project design features that include noise control.

Policy 6.2: Encourage industrial uses to locate vehicular traffic and operations away from abutting residential zones as much as possible.

Construction, Maintenance, and Nuisance Noise

Construction operations and maintenance vehicles such as refuse trucks and parking lot sweepers generate noise throughout the City. Although these types of noise sources tend to be short term, temporary, and limited, they can be a source of annoyance, especially during the late night or early morning hours.

GOAL 7.0: Minimize construction, maintenance vehicle, and nuisance noise in residential areas and near noise-sensitive land uses.

Policy 7.1: Schedule City maintenance and construction projects so that they generate noise during less sensitive hours.

Policy 7.2: Require developers and contractors to employ noise minimizing techniques during construction and maintenance operations.

Policy 7.3: Limit the hours of construction and maintenance operations located adjacent to noise-sensitive land uses.

Policy 7.4: Encourage limitations on the hours of operations and deliveries for commercial, mixed-use, and industrial uses abutting residential zones.

NOISE PLAN

Noise is most often defined as unwanted sound. Potential noise problem areas are considered to be those areas where ambient noise levels exceed established noise standards, and areas where sensitive land uses are exposed to excessive ambient noise levels. Excessive noise is viewed as a disturbance, especially to residential communities and other noise-sensitive uses. Noise sources in Orange fall into two categories: transportation oriented and non-transportation oriented. Examples of transportation oriented noise include noise generated by vehicles, airplanes, and rail cars operating within the City. Examples of non-transportation noise include noise generated from mechanical or industrial processes and lawn equipment.



The most prevalent noise source within the City is vehicular traffic on highways, freeways, toll roads, and arterials—specifically, the I-5, SR-55, SR-57, SR-91 and SR-22 freeways that surround and pass through the City; the SR-241 toll road that crosses the eastern portion of the City; and the many arterial roadways that traverse almost all areas of the community.

Other noise sources include passenger and freight rail operations, industrial facilities, loading docks and mechanical equipment at retail centers. Periodic sources of noise include train traffic (Amtrak, Metrolink, and freight trains); aircraft overflights into and out of John Wayne Airport, Long Beach Airport, and Los Alamitos Army Air Station; helicopter traffic along the Main Street and Katella Avenue corridors and over residential neighborhoods; sporting and exhibition events and fireworks shows in the City of Anaheim; and operation of trucks and machinery throughout Orange’s industrial areas.

Measuring Noise

Although sound can be easily measured, the perception of noise levels is subjective and the physical response to sound complicates the analysis of its effects on people. People judge the relative magnitude of sound sensation in subjective terms such as noisiness or loudness. Sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures, the scale of which gives the level of sound in decibels (dB). Table N-1 presents the subjective effect of changes in sound pressure levels.

| Table N-1 Changes in Sound Pressure Levels, dB | |
|--|--|
| dB Change | Change in Apparent Loudness |
| +/- 3 dB | Threshold of human perceptibility |
| +/- 5 dB | Clearly noticeable change in noise level |
| +/-10 dB | Half or twice as loud |
| +/-20 dB | Much quieter or louder |
| Source: Engineering Noise Control, Bies and Hansen (1988). | |

To account for the pitch of sounds and an average human ear’s response to such sounds, a unit of measure called an A-weighted sound pressure level (dBA) is used. To provide some perspective on the relative loudness of various types of noise, Table N-2 lists common sources of noise and their approximate noise levels.

Many metrics have been developed to account for the way humans perceive sound. The most common of these descriptors are the average “equivalent” noise level (Leq), the Day Night noise level (Ldn), and the Community Noise Equivalent Level (CNEL). Leq represents a measure of the average noise level at a given location over a specified period of time. Ldn and CNEL are based on a 24-hour Leq which applies offsets to evening and nighttime noise levels to account for the increased sensitivity of people to noise occurring at night. The Ldn is a 24-hour average sound level (similar to a 24-hour Leq) in which a 10 dB penalty is added to any sound occurring between the hours of 10:00 p.m. and 7:00 a.m. CNEL is similar to Ldn, except that a five dB penalty is also added for noise occurring during evening hours from



7:00 p.m. to 10:00 p.m. Therefore, both the Ldn and CNEL noise metrics provide 24-hour averages of noise level exposure at a particular location, with temporal adjustments that reflect the increased sensitivity to noise during the evening and nighttime hours¹. CNEL is the noise level descriptor, consistent with state guidelines, applied by the City throughout this Noise Element to describe the current and future noise environment affected by transportation-generated noise.

| Table N-2 Typical Noise Levels of Common Outdoor and Indoor Activities | | |
|---|-------------------|--|
| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
| | 110 | Rock Band |
| Jet Fly-over at 1,000 feet | 100 | |
| | 90 | |
| Diesel Truck at 50 feet, at 50 mph | 80 | Food Blender at three feet Garbage Disposal at three feet |
| Noisy Urban Area, Daytime | 70 | Vacuum Cleaner at 10 feet Normal speech at three feet |
| Gas Lawn Mower at three feet Commercial Area | 60 | |
| Heavy Traffic at 300 feet | 50 | Large Business Office Dishwasher Next Room |
| Quiet Urban Daytime | 40 | Theater, Large Conference Room (background) |
| Quiet Urban Nighttime | 30 | Library |
| Quiet Suburban Nighttime | 20 | Bedroom at Night, Concert Hall (background) |
| | 10 | Broadcast/Recording Studio |
| Quiet Rural Nighttime | 0 | Lowest Threshold of Human Hearing |
| Lowest Threshold of Human Hearing | 0 | |

Source: Table N-2136.2 of California Department of Transportation's Technical Noise Supplement to the Traffic Noise Analysis Protocol (October 1998).

Noise Standards and Land Use Compatibility

Orange has developed its own land use compatibility standards, based on recommended parameters from the California Governor's Office of Planning and Research, that rate compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. Using these land use compatibility guidelines, the City has established interior and exterior noise standards.

¹ In practical implementation CNEL and L_{dn} could be used interchangeably for traffic generated noise as the difference between these two descriptors for urban / suburban noise levels is less than one dB.



The City's compatibility standards provide only for normally acceptable conditions, based on state recommendations and City land use designations. The City's Land Use Compatibility standards are presented in Table N-3. These standards, which use the CNEL noise descriptor, are intended to be applicable for land use designations exposed to noise levels generated by transportation related sources. Land use compatibility noise exposure limits are generally established as 65 dBA CNEL for a majority of land use designations throughout the City. Higher exterior noise levels are permitted for multiple-family housing and housing in mixed-use contexts than for single-family houses. This is because multiple-family complexes are generally located in transitional areas between single-family and commercial districts or in proximity to major arterials served by transit, and a more integrated mix of residential and commercial activity (accompanied by higher noise levels) is often desired in mixed-use areas close to transit routes. These standards establish maximum interior noise levels for new residential development, requiring that sufficient insulation be provided to reduce interior ambient noise levels to 45 dBA CNEL.

The City's land use compatibility standards are based first on the General Plan land use designation of the property, and secondly on the use of the property. For example, within the Urban Mixed-use designation, a multiple-family use exposed to transportation related noise would have an exterior noise standard of 65 dBA CNEL, and an interior noise standard of 45 dBA CNEL. Noise standards for multiple-family and mixed-use land use designations shown in Table N-3 are higher than those for rural or single-family residential areas, reflecting the gradually changing character of Orange and a more urban environment planned for certain areas of the City. The standards shown in Table N-3 are purposefully general in nature, and not every specific land use which could be accommodated within each General Plan designation is identified. Application of the standards will vary on a case-by-case basis according to location, development type, and associated noise sources.

When non-transportation (stationary) noise is the primary noise source, and to ensure that noise producers do not adversely affect noise-sensitive land uses, the City applies a second set of standards when planning and making development decisions. These hourly and maximum performance standards (expressed in Leq) for non-transportation or stationary noise sources are designed to protect noise sensitive land uses adjacent to stationary sources from excessive noise. Table N-4 summarizes City stationary source noise standards for various land use types. These standards represent the acceptable exterior noise levels at the sensitive receptor.

For City analysis of noise impacts and determining appropriate mitigation under the California Environmental Quality Act (CEQA), in addition to the maximum allowable noise level standards outlined in Tables N-3 and N-4, an increase in ambient noise levels is assumed to be a significant noise impact if a project causes ambient noise levels to exceed the following:

- Where the existing ambient noise level is less than 65 dBA, a project related permanent increase in ambient noise levels of 5 dBA CNEL or greater.
- Where the existing ambient noise level is greater than 65 dBA, a project related permanent increase in ambient noise levels of 3 dBA CNEL or greater.



**Table N-3
Maximum Allowable Noise Exposure—Transportation Sources**

| Land Use | | CNEL (dBA) | |
|---|--|-------------------------|-----------------------|
| Designations (as shown on Figure LU-5) | Uses | Interior ^{1,3} | Exterior ² |
| Estate Low Density Residential Low Density Residential Low Medium Density Residential | Single-family, duplex, and multiple-family | 45 | 65 |
| | Mobile home park | N/A | 65 |
| Medium Density Residential Neighborhood Mixed-use Neighborhood Office Professional Old Towne Mixed-use General Commercial Yorba Commercial Overlay Urban Mixed-use Urban Office Professional | Single-family | 45 | 65 |
| | Mobile home park | N/A | 65 |
| | Multiple-family, mixed-use | 45 | 65 ^{4,5} |
| | Transient lodging—motels, hotels | 45 | 65 |
| | Sports arenas, outdoor spectator sports | N/A | N/A |
| | Auditoriums, concert halls, amphitheaters | 45 | N/A |
| | Office buildings, business, commercial and professional | 50 | N/A |
| | Manufacturing, utilities, agriculture | N/A | N/A |
| Public Facilities and Institutions | Schools, nursing homes, day care facilities, hospitals, convalescent facilities, dormitories | 45 | 65 |
| | Government Facilities—offices, fire stations, community buildings | 45 | N/A |
| | Places of Worship, Churches | 45 | N/A |
| | Libraries | 45 | N/A |
| | Utilities | N/A | N/A |
| | Cemeteries | N/A | N/A |
| Recreation Commercial Open Space Open Space—Park Open Space—Ridgeline Resource Area | Playgrounds, neighborhood parks | N/A | 70 |
| | Golf courses, riding stables, water recreation, cemeteries | N/A | N/A |

Notes:

- (1) Interior habitable environment excludes bathrooms, closets and corridors.
- (2) Exterior noise level standard to be applied at outdoor activity areas; such as private yards, private patio or balcony of a multi-family residence. Where the location of an outdoor activity area is unknown or not applicable, the noise standard shall be applied inside the property line of the receiving land use.
- (3) Interior noise standards shall be satisfied with windows in the closed position. Mechanical ventilation shall be provided per Uniform Building Code (UBC) requirements.
- (4) Within the Urban Mixed-Use, Neighborhood Mixed-Use, Old Towne Mixed-use, and Medium Density Residential land use designations, exterior space standards apply only to common outdoor recreational areas.
- (5) Within Urban Mixed-Use and Medium Density Residential land use designations, exterior noise levels on private patios or balconies located within 250 feet of freeways (I-5, SR-57, SR-55, SR-22, or SR-241) and Smart Streets and Principal Arterials identified in the Circulation & Mobility Element that exceed 70 dB should provide additional common open space.

N/A=Not Applicable to specified land use category or designation

Source: Alliance Acoustical Consultants, modified by EDAW, 2008



**Table N-4
Maximum Allowable Noise Exposure—Stationary Noise Sources**

| Noise Level Descriptor | Daytime (7 a.m. to 10 p.m.) | Nighttime (10 p.m. to 7 a.m.) |
|---|------------------------------------|--------------------------------------|
| Hourly Equivalent Level (L _{eq}), dBA | 55 | 45 |
| Maximum Level (L _{max}), dBA | 70 | 65 |

Notes:

- (1) These standards apply to new or existing noise sensitive land uses affected by new or existing non-transportation noise sources, as determined at the outdoor activity area of the receiving land use. However, these noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).
- (2) Each of the noise levels specified above should be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g. caretaker dwellings).
- (3) No standards have been included for interior noise levels. Standard construction practices that comply with the exterior noise levels identified in this table generally result in acceptable interior noise levels.
- (4) The City may impose noise level standards which are more or less restrictive than those specified above based upon determination of existing low or high ambient noise levels. If the existing ambient noise level exceeds the standards listed in Table N-4, then the noise level standards shall be increased at 3 dB increments to encompass the ambient environment. Noise level standards incorporating adjustments for existing ambient noise levels shall not exceed a maximum of 70 dB Leq.

Noise Contours and Impact Areas

The community noise environment can be described using contours derived from monitoring major sources of noise. Noise contours define areas of equal noise exposure. Future noise contours have been estimated using information about both current and projected future land use development and traffic volumes. The contours assist in setting policies for distribution of land uses and establishing development standards.

A study of baseline noise sources and levels was completed by Alliance Acoustical Consultants in November 2004. Noise level measurements were collected during a typical weekday at 28 locations throughout Orange. Criteria for site selection included geographical distribution, land uses suspected of noisy activities, proximity to transportation facilities, and noise-sensitive land uses. The primary purpose of noise monitoring was to establish a noise profile for the planning area that could be used to estimate levels of current and future noise.

Measurements represent motor vehicle noise emanating from freeways, the local roadway network, and industrial land uses. Typical noise sources measured during the short-term survey included vehicular traffic, aircraft, trains, emergency sirens, industry, mechanical equipment, sporting events, firework shows, children playing, motorcycles, car alarms, and car audio systems. Of all these sources, traffic noise was determined to be the predominant noise source.

Figure N-1 identifies noise contours for baseline year 2004. Major arterials and the railroad and freeway network represent the major sources of noise. A number of areas are exposed to traffic noise from arterials in excess of 65 dBA CNEL, including areas near State College Boulevard/The City Drive, Chapman Avenue, La Veta Avenue, Batavia Street, Glassell Street, Tustin Street, Katella Avenue, and Jamboree Road.



The Land Use Element indicates that the planning area will accommodate additional future growth, accompanied by an increase in citywide traffic volumes. Traffic volume increases represent the major anticipated measurable new noise sources in the community over the long term. Potential future ambient noise levels can be estimated by modeling. Figure N-2 displays projected year 2030 noise contours based upon future traffic levels.

Figure N-2 indicates that noise levels may be expected to rise in areas where roadways will experience the greatest increase in traffic volumes over time. Specifically, these areas include Tustin Street, State College Boulevard/The City Drive, Chapman Avenue, Jamboree Road, Santiago Canyon Road, Glassell Street, Main Street, I-5, SR-57, SR-22, SR-55, SR-241, SR-261, the Burlington Northern/Santa Fe Railroad, and throughout the City's industrial area,

Identification of Noise Problem Areas

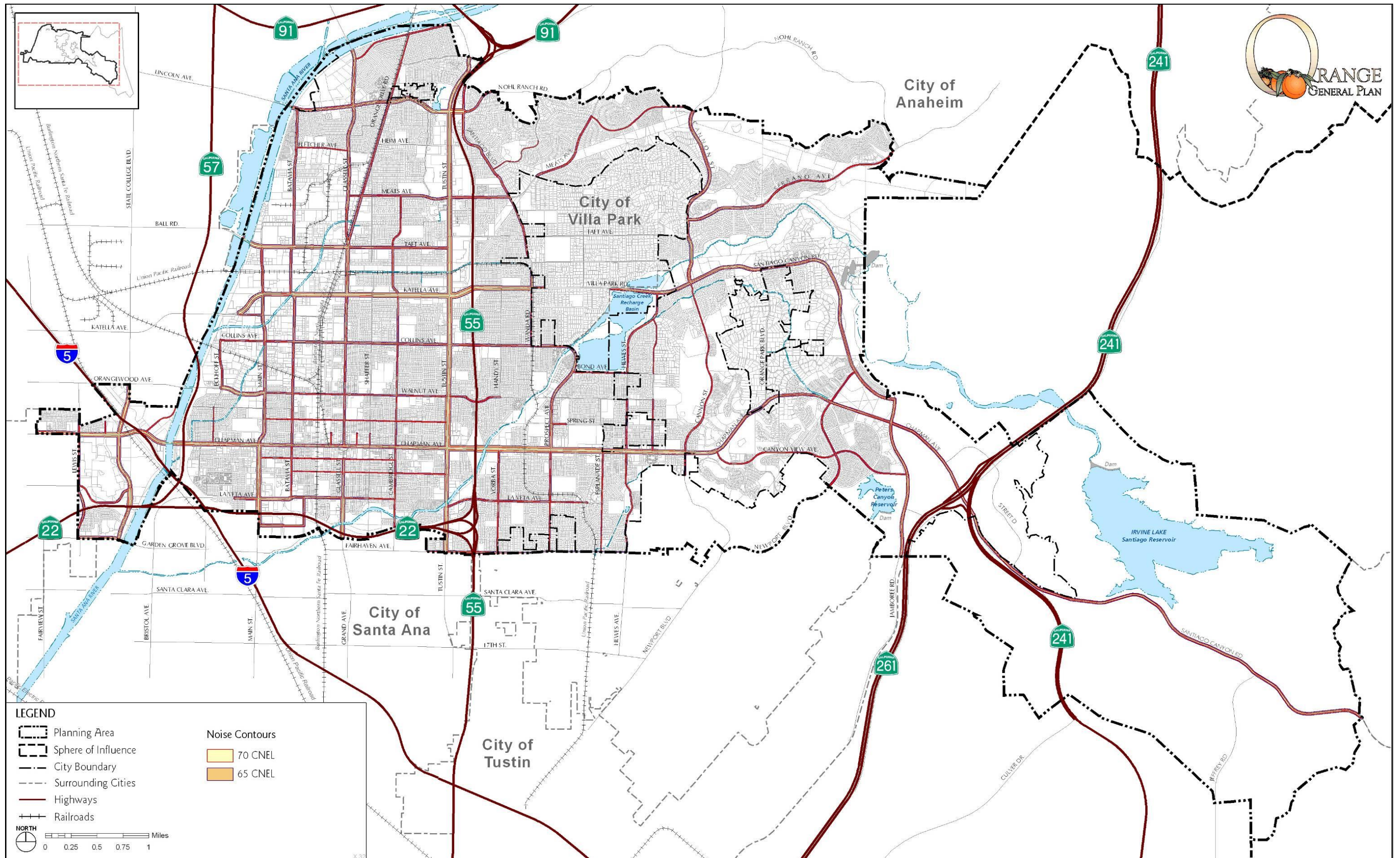
Potential noise problem areas are considered to be those areas where ambient noise levels exceed established noise standards and areas where sensitive land uses are exposed to ambient noise levels in excess of standards identified in Tables N-3 and N-4. For the most part, these problem areas lie along freeways, toll roads, and arterial and secondary roadways where noise barriers have not been installed.

Beneath the landing pattern for aircraft approaching John Wayne Airport in Santa Ana, Long Beach Airport, and Los Alamitos Army Air Station, some residents in the area find the aircraft noise disturbing. The aircraft noise may be considered an intermittent, recurring noise problem. Helicopter noise from private, police, emergency medical, and news and traffic monitoring helicopters also contributes to the general noise environment in the City, particularly approaching University of California Irvine (UCI) Medical Center and Children's Hospital of Orange County (CHOC).

An additional noise problem cited by residents citywide is noise associated with the operation of hand-held, motorized leaf blowers. Gasoline powered blowers, which are generally used to clear debris from driveways, sidewalks, and landscaped areas generate noise levels in the range of 60 to 85 dBA L_{eq} (measured 50 feet from the source). This noise level may exceed the standard established for stationary noise sources during both daytime and nighttime hours.

Noise Control Techniques

The most efficient and effective means of controlling noise is to reduce noise at the source. However, regarding noise generated from transportation systems, the City has no direct control over noise produced by trucks, cars, and trains, because state and federal noise regulations preempt local laws. Given that the City cannot control transportation noise at the source, City noise programs and standards focus on reducing transportation noise along freeways, arterial roadways, and rail corridors, through noise reduction methods that interrupt the path of the noise or directly shield the receiver. The emphasis of such noise reduction methods should be placed on site planning and design. Such reduction measures may include building orientation, spatial buffers, landscaping, and noise barriers. The use of noise barriers, such as sound walls, should be considered as a means of achieving the noise



Note: Large format map available at the Community Development Department

Figure N-1. 2004 Noise Contours



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standards only after all other practical design-related noise reduction measures have been integrated into the project.

Sound walls may not be desirable in some cases, such as intersections in commercial areas where visibility and access are important. Additionally, effective acoustical design features in new development can provide additional interior noise reduction. Regarding stationary and non-transportation generated noise, noise levels are to be addressed at the source as a primary focus. For mixed-use development in particular, acoustical design should be applied that isolates residential portions of mixed-use development from both commercial portions and external noise sources. When it is not feasible to address stationary noise at the source, the aforementioned noise reduction methods will be employed to reduce noise exposure to the levels presented in Table N-5.

| Table N-5 Sample Interior Noise Control Measures | | |
|---|---|--|
| Noise Exposure Level | Exterior to Interior Noise Level Reduction (NLR) Required to Achieve 45 dBA CNEL | Noise Control Measures and Façade Upgrades |
| ➤ ≤60 dBA CNEL | 15 dBA | Normal construction practices consistent with the Uniform Building Code are typically sufficient. |
| 60 dBA to 65 dBA CNEL | 20 dBA | Normal construction practices consistent with the Uniform Building Code are sufficient with the addition of the following specifications: <ul style="list-style-type: none"> • Air conditioning or mechanical ventilation systems are installed so that windows and doors may remain closed. • Windows and sliding glass doors are mounted in low air infiltration rated frames (0.5 cfm or less). • Exterior doors are solid core with perimeter weather-stripping and threshold seals. |
| 65 dBA to 70 dBA CNEL | 25 dBA | Normal construction practices consistent with the Uniform Building Code are sufficient with the addition of the following specifications: <ul style="list-style-type: none"> • Air conditioning or mechanical ventilation systems are installed so that windows and doors may remain closed. • Windows and sliding glass doors are mounted in low air infiltration rated frames (0.5 cfm or less). • Exterior doors are solid core with perimeter weather-stripping and threshold seals. • Glass in both windows and exterior doors should have a Sound Transmission Classification (STC) rating of at least 30. • Roof or attic vents facing the noise source of concern should be boxed, or provided with baffling. |
| Notes: (1) The information listed in this table is sample guidance for interior noise control recommendations and is not intended for application to individual development projects, renovations, or retrofits. Noise-sensitive land uses located in areas with noise level exposures exceeding 60 dBA CNEL should have a detailed acoustical analysis performed on a case by case basis. | | |

The most common and feasible method to control exterior-to-interior noise levels is achieved through improvements to the building structure and use of wall/façade treatments that reduce noise levels. Buildings constructed consistent with the Uniform Building Code (UBC) typically provide approximately 15 dBA of exterior-to-interior noise level reduction (NLR) with



windows open, and 25 dBA of NLR with windows closed. Therefore, special consideration must be given to reducing interior noise levels to the required 45 dBA CNEL at noise-sensitive land uses exposed to noise levels in excess of 60 dBA. The NLR of a wall element or building façade can be calculated by first assuming a generalized A-weighted noise frequency spectrum for roadway traffic noise. Then, the composite transmission loss of the various wall materials and the wall's structural design is considered in determining the resulting noise level in the receiving room. After correcting for room absorption, the overall noise level in the room is calculated. The ability to perform these calculations requires detailed floor plans and façade construction details. Calculation of required NLR and resultant interior noise levels should be conducted by a qualified acoustical consultant. Table N-5 provides an example of varying levels of building façade improvements that may be required to achieve compliance with the interior noise level standard of 45 dBA CNEL for land uses exposed to three different noise levels: 60 dBA CNEL, 65 dBA CNEL, and 70 dBA CNEL.

City Noise Control Ordinance

The primary tool used to implement noise policy will be the City's noise control ordinance (Title 8 Health and Safety, Chapter 8.24, Orange Municipal Code). The ordinance gives the City authority to regulate noise at its source and thereby protect noise-sensitive land uses. It also establishes exterior and interior noise standards for all residential properties. The ordinance specifies permitted days and times for construction, repair, remodeling, or grading of real property, and exemptions to the ordinance.

The City will continue to apply provisions of the noise control ordinance, and will modify the noise ordinance as needed to respond to policy direction within this Element, including the noise standards specified in Table N-4, and policies addressing noise in mixed-use land use districts.

State Noise Standards

The City will continue to enforce state laws which set forth requirements for the insulation of residential dwelling units from excessive and potentially harmful noise. Title 25, Section 1092 of the California Administrative Code establishes exterior and interior noise standards for multi-family residential development. Units established in areas where ambient noise levels exceed 65 dBA CNEL must incorporate noise reduction features into project design and construction. To reduce exterior noise levels, open space and other outdoor private areas should be shielded from the primary noise source (e.g., a freeway or railroad track). Insulation must be provided to reduce interior ambient noise levels to 45 dBA CNEL or lower, pursuant to Title 24 requirements. The City will continue to enforce these regulations.

Particular challenges arise in the application of standards to mixed-use areas. Residential portions of mixed-use projects must meet the 45 dBA CNEL Title 24 interior noise requirements while located on busy commercial corridors. This obligation can be met by incorporating design features that insulate residential uses from commercial portions of the project.



Sound Walls Along Toll Roads, Arterials, and Secondary Roadways

The City will encourage Caltrans and the TCA to abide by Section 215.5 of the State Streets and Highway Code, which establishes a priority system for constructing noise barriers in the form of sound walls along freeways, to minimize exposure of residential or other noise-sensitive land uses to excessive freeway noise. Furthermore, all new residential development proposed adjacent to toll roads, arterials, and secondary roadways will be required to buffer itself by providing sound walls or a combination of berms and walls designed to achieve the noise and land use compatibility standards indicated in Table N-3 within common open spaces. In the event that sound walls are used, the analysis should include evaluation of multiple reflections between parallel noise barriers (e.g., large structures, noise barriers on each side of the highway) which could reduce the acoustical performance of individual barriers or result in unintended impacts to other parts of the community.

Land Use Policy and Design of Residential Projects

To mitigate non-transportation-related noise, the City will require site plan adjustments, higher insulation performance, spatial buffers, and other mitigation measures to absorb and block sound as needed. Design features incorporated into residential projects can be used to shield residents from excessive noise. For example, bedrooms, balconies and open space areas can be located away from streets and focused toward the interior of a project. The City will develop guidelines to assist developers to design structures that respond to noise concerns.

Acoustical Studies

Under certain conditions, the City may require acoustical studies to be prepared as part of the development review process to ensure adequate analysis of proposed development projects. Acoustical studies will be required for all discretionary projects where any of the following apply:

- The project includes a noise-sensitive land use that is located within the existing or future 65 dBA CNEL contour for transportation noise sources.
- The project will cause future traffic volumes to increase by 25 percent or more on any roadway that fronts a sensitive land use.
- The project will expose a noise-sensitive land use to a stationary noise source or vibration source exceeding the standards outlined in Table N-4. Such stationary sources may include mechanical equipment operations, entertainment venues, and industrial facilities.
- The project includes a noise-sensitive land use in the vicinity of existing or proposed commercial and industrial areas.
- The project is a mixed-use development that includes a residential component. The focus of this type of acoustical study is to determine likely interior and exterior noise levels and to recommend appropriate design features to reduce noise.



An acoustical analysis prepared in accordance with this Noise Element shall:

- be the financial responsibility of the applicant seeking City approval of a project;
- be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics;
- include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and predominant noise sources;
- estimate existing and projected cumulative noise in terms of CNEL or L_{eq} , and compare those noise levels to the adopted standards and policies of the Noise Element;
- recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance; and
- estimate noise exposure after the prescribed mitigation measures have been implemented.

Truck Routes

Truck traffic generates noise that can disturb people in residential and other noise-sensitive land uses. Heavy trucks will not be permitted to drive through residential neighborhoods. Truck routes in Orange are located mostly in the general industrial area in the western part of the City, as well as on the higher capacity roadways that traverse the planning area. Truck routes are identified for such purposes as noise reduction, safety, roadway maintenance, and traffic operations. The Orange Municipal Code identifies trucks as motor vehicles designed, used, or maintained primarily for the transportation of property and having an unladen weight of six thousand pounds or more.

Air Traffic Noise

To lessen the impacts of noise associated with air traffic into and out of John Wayne Airport, Long Beach Airport, and Los Alamitos Army Air Station, the City will participate in regional efforts to require airlines to use quieter aircraft. Also, the City will work with airport officials and surrounding jurisdictions to restore instrument approach patterns (as opposed to visual approach) at John Wayne Airport. Finally, the City will continue to register noise complaints with the airport's Noise Abatement Office to ensure airport officials are made aware of any noise problems.

A limited number of heliports and helistops are located throughout the City, with the most active locations being UCI Medical Center and Childrens' Hospital of Orange County. Helicopter operations at these facilities are regulated by the Federal Aviation Administration, Caltrans Division of Aeronautics, and the Orange County Airport Land Use Commission. The City will work with these parties to ensure compliance with all state and federal laws pertaining to helicopter operations.



Rail Traffic Noise

The City has established a “quiet zone” along portions of the Burlington Northern/Santa Fe Railroad corridor. Federal Railroad Administration regulations allow cities to delineate zones where trains are not allowed to blow warning horns. Without a formally established “quiet zone”, trains approaching all railroad crossings that intersect public streets are required to blow a warning horn at the intersection to warn motorists and pedestrians. “Quiet zones” may reduce noise impacts at these crossings, and will continue to be supported so long as they do not increase traffic and pedestrian hazards.

NOISE IMPLEMENTATION

The goals, policies, and plans identified in this Element are implemented through a variety of City plans, ordinances, development requirements, capital improvements, and ongoing collaboration with regional agencies and neighboring jurisdictions. Specific implementation measures for this Element are contained in the General Plan Appendix.